STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE FACILITY (LAW) SECONDARY OFFGAS/VESSEL VENT PROCESS SYSTEM (LVP) MISCELLANEOUS TREATMENT UNIT (MTU) SUBSYSTEMS ANCILLARY EQUIPMENT

BECHTEL

Job No. 24590

Bechtel National, Inc

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED								

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No N/A Rev
[When applicable]

Accepted by DC Pflueger (Print Name) (Signature) 1/11/05 (Date)

Released by N/A (Print Name) (Signature) (Date)
[When applicable]

416 GP&S 7-03

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

24590-CM-HC4-HXYG-00138-02-00053 Rev 00A

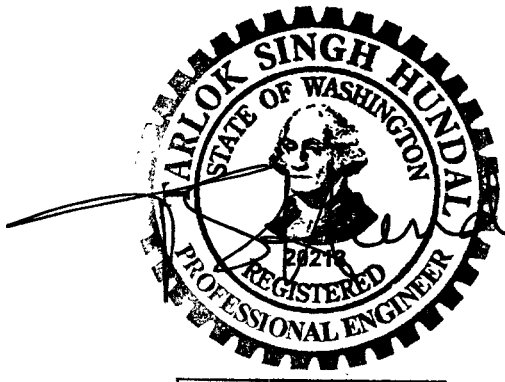
IQRPE REVIEW
OF
THE LOW ACTIVITY WASTE FACILITY (LAW)
SECONDARY OFFGAS/VESSEL VENT PROCESS SYSTEM (LVP)
MISCELLANEOUS TREATMENT UNIT (MTU)
SUBSYSTEMS ANCILLARY EQUIPMENT

"I, Tarlok Hundal have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Facility (LAW) Secondary Offgas/Vessel Vent Process System (LVP) Miscellaneous Treatment Unit (MTU) Subsystems Ancillary Equipment as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640(3) (a) through (g) applicable components."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is nine (9) pages numbered one (1) through nine (9).



EXPIRES: 02/15/06

T S Hundal
Signature

1-7-05
Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment includes the LAW LVP MTU Subsystems Ancillary Equipment associated with the following plant items and components as shown on drawings 24590-LAW-M6-LVP-P0001, -P0002, -P0004, and –P0005: • HEPA filters LVP-HEPA-00001A/B, LVP-HEPA-00002A/B, and LVP-HEPA-00003A with preheaters • Mercury adsorbers LVP-ADBR-00001A/B • Catalytic Oxidizer/Reducer Unit consisting of a heat recovery unit (LVP-HX-00001), an electric heater (LVP-HTR-00002), a volatile organic carbon (VOC) catalyst (LVP-SCO-00001), and selective catalytic reduction (SCR) catalyst (LVP-SCR-00001) • Caustic Scrubber (LVP-SCB-00001) • Exhausters LVP-EXHR-00001/A/B/C • Heaters LVP-HTR-00001A/B The LVP system begins where the LAW vessel vents and the LAW melter offgas flows merge and ends at the top of the stack where the offgas is discharged.
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

References	Drawings and System Description	Drawings: 24590-LAW-M6-LVP-P0001, Rev. 0, P&ID – LAW Secondary Offgas/Vessel Vent Process System Melters Secondary Offgas; 24590-LAW-M6-LVP-P0002, Rev. 2, P&ID – LAW Secondary Offgas/Vessel Vent Process System and Stack Discharge Monitoring System (Q); 24590-LAW-M6-LVP-P0003, Rev. 0, P&ID – LAW Secondary Offgas/Vessel Vent Process System Equipment Vents; 24590-LAW-M6-LVP-P0004, Rev. 0, P&ID - LAW Melters Secondary Offgas, Vessel Vent Process Systems Mercury Mitigation Equipment; 24590-LAW-M6-LVP-P0005, Rev. 0, P&ID – LAW Melters Secondary Offgas Vessel Vent Process System SCR, VOC, & Ammonia Dilution Packages; 24590-LAW-M5-V17T-P0010, Rev. 0, Process Flow Diagram LAW Vitrification Ammonia & Secondary Offgas (System AMR & LVP); 24590-LAW-M5-V17T-P0011, Rev. 0, Process Flow Diagram LAW Vit Secondary Offgas Treatment (System LVP); 24590-LAW-P1-P01T-P0004, Rev. 0, LAW Vitrification Building General Arrangement Plan at El. 28'-0". 24590-LAW-P1-P01T-00005, Rev. 1, LAW Vitrification Building General Arrangement Plan at El. 48'-0"; 24590-LAW-P1-P01T-P0007, Rev. 5, LAW Vitrification Building General Arrangement Section A-A, B-B, and C-C; 24590-LAW-P1-P01T-P0009, Rev. 5, LAW Vitrification Building General Arrangement Section G-G, H-H, and J-J; System Description: 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas, including System Description Change Notice (SDCN) 24590-LAW-3YN-LOP-00001, -0003, and -0004.

	Information Assessed	Source Document	Assessment
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-3DP-G04T-00905, Rev. 3, Determination of Quality Levels.	The Pipe Stress Design Criteria document identifies ASME B31.3 as the design code for piping systems for the WTP. P&ID drawings identify the Seismic Categories and Quality Levels of the MTU subsystem equipment considered in this assessment. The Pipe Stress Design Criteria document provides required seismic analysis methods and acceptance criteria for Seismic Categories (SC-I) through (SC-IV) to ensure continued function during normal operations, abnormal operations, and during and after a Design Basis Earthquake. The Determination of Quality Levels document defines the Quality Levels of the plant equipment. The above listed design criteria, codes, and standards are appropriate and adequate for the intended use of the LVP MTU subsystem equipment.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3, Process Piping, 1996 Edition, American Society of Mechanical Engineers.	The LVP MTU subsystem equipment within the scope of this assessment is built to design standards. The Pipe Stress Design Criteria document specifies that piping is to be designed in accordance with ASME B31.3 Code.

Information Assessed		Source Document	Assessment
Design	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-DC-PS-01-001, Rev 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; DOE-STD-1020-94, Natural Phenomenon Hazards Design Evaluation Criteria for Department of Energy Facilities (including Change Notice #1, January 1996); ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Code Case N-411, Subsection NC, Appendix N, and Appendix F, 1995; UBC, Uniform Building Code, 1997 Edition.	The Basis of Design document specifies that WTP mechanical equipment is to be designed for a nominal plant life of 40 years. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant item is to be constructed of the same material as the vessel and with the same or greater corrosion allowance unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. The Pipe Stress Design Criteria document requires the use of the ASME B31.3 Code and DOE-STD-1020-94 Standard for piping design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion and contraction, settlement, vibration, and corrosion allowance in the design of piping. ASME BPV Code, Section III, Subsection NC, Appendix N, Appendix F, and Code Case N-411, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 and DOE-STD-1020-94 for design as applicable to the appropriate Seismic Category of the ancillary equipment. Details of the seismic analysis methods and acceptance criteria are specified in the Pipe Stress Design Criteria document. These are appropriate and adequate codes and standards to ensure that the LVP MTU subsystem equipment included in this assessment has adequate strength at the end of its design life to withstand all anticipated loads.

Information Assessed		Source Document	Assessment
Supports	Ancillary equipment supports are adequately designed.	Drawings listed above under References; 24590-WTP-DC-PS-01-002, Rev. 2, Pipe Support Design Criteria; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; MSS-SP-58, Manufacturers Standardization Society Standard Practice 58, Pipe Hangers and Supports – Materials, Design, and Manufacture; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NF and Appendix F, 1995; 24590-WTP-PL-PS-01-001, Rev. 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS); 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design.	P&IDs drawings identify the seismic categories of LVP MTU subsystem equipment within the scope of this assessment. The Pipe Support Design Criteria document categorizes pipe supports based upon the piping seismic classification. This document then specifies ASME B31.3, including MSS-SP-58, for supports for piping categories SC-I/II. For categories SC-III/IV, ASMI B31.3 is supplemented by ASME Section III, Division 1, Subsection NF and Appendix F. Bounding load cases are passed to the pipe support designers from the results of piping stress analyses. Details of the seismic design methodology and allowable limits are given in the Pipe Support Design Criteria document. Analysis is by manual calculation and computer programs that have been tested and approved as discussed in the Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs. The Ancillary Equipment Pipe Support Design document shows examples of typical equipment supports. Ancillary equipment supports are to be designed in such a way that the heat transferred from supports to the building structure does not raise the building structure temperature to exceed 150°F for concrete and 200°F for steel. These are appropriate codes and standards for design of the LVP MTU subsystem equipment supports.

Information Assessed		Source Document	Assessment
Connections	Seams and connections are adequately designed.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications ASME/ANSI B16.5, 1988 Edition, Piping Flanges and Flanged Fittings.	The piping systems addressed in this assessment contain both welded and flanged connections. The Pipe Stress Design Criteria document specifies the ASME B31.3 Process Piping design code for all WTP piping systems. Welded seams and connections are designed and welded in accordance with ASME B31.3 and welded in accordance with the ASME B&PV Code, Section IX. Flange connections are to be designed in accordance with ANSI B16.5. These are appropriate and adequate codes and standards for design and fabrication of seams and connections associated with the LVP MTU subsystem equipment assessed herein.
Frost Heave	The system will withstand the effects of frost heave.	General Arrangement Drawings and System Description listed above under References; 24590-WTP-DC-ST-01-001, Rev. 4, Structural Design Criteria.	The LVP MTU subsystem equipment considered in this assessment is located in process cells inside the LAW Facility as shown in the General Arrangement drawings listed under References. The Structural Design Criteria document requires that all structural foundations shall extend into the surrounding soil below the frost line to preclude frost heave. The frost line is 30 in. below grade. The LAW building foundation mat in the areas of the facility containing the assessed equipment is at the (-) 21'- 0" elevation. Therefore, the LVP MTU equipment located inside the building is not subject to frost heave.
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	System Description listed above under References.	The function of the LVP MTU subsystem equipment is the transfer of waste between LAW Secondary Offgas miscellaneous treatment units. The characteristics of the waste handled by the equipment addressed in this assessment will be the same as that handled by the MTUs. The identification of waste characteristics for the MTUs is addressed in separate integrity assessments. The System Description listed under References provides a summary of design criteria required to mitigate identified hazards associated with the MTUs.

Information Assessed		Source Document	Assessment
Waste Characteristics	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	Drawings and System Description listed above under References; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessels (MTUs) unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modifications. Piping material classes for the LVP MTU subsystem are identified on the P&IDs drawings listed under References. Required materials for identified piping material classes are shown in the Piping Material Class Description document. Treatment reagents are added to the LVP system; ammonia to the Catalytic Oxidizer Unit and 5M sodium hydroxide to the Caustic Collection Tank.
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	24590-WTP-DB-ENG-01-001, Rev.1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation; Annual Book of ASTM Standards, American Society of Testing and Materials.	The Basis of Design identifies a service design life of 40 years for WTP mechanical equipment. Detailed material selection (corrosion) analyses are conducted for each vessel and major component, including MTUs, in the LAW LVP system during process design. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessels (MTUs) except as noted therein. The Thermal Insulation specification requires that insulating materials used on austenitic stainless steel be qualified in accordance with applicable ASTM procedures and tests to preclude external corrosion of ancillary equipment. Both internal and external corrosion have been adequately addressed and the assessed equipment will provide the expected design service life.

Information Assessed		Source Document	Assessment
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Pipe Stress Design Criteria document requires use of the ASME B31.3 Code for ancillary equipment design. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service design life of 40 years for WTP equipment is identified in the Basis of Design document. Detailed material selection (corrosion) analyses are conducted for each vessel and major component, including MTUs, in the LVP system in the LAW Facility during process design. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal material and with the same or greater corrosion allowance as the source vessel (MTU) except as noted therein. Piping material classes are shown on the P&ID drawings. Bounding corrosion allowances are listed for each piping material class in the Piping Material Class Description document. The corrosion/erosion allowance for the 316L stainless steel and N08367 stainless steel used in the LVP MTU subsystem equipment is 0.040 in. and 0.0425 in. respectively. The material and corrosion allowance are appropriate and adequate for the intended service life of the MTU subsystem equipment.
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Pipe Stress Design Criteria document specifies use of ASME B31.3 as the design code for WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure relieving device must be designed for at least the highest pressure that can be developed. Piping material classes are shown on the P&ID drawings. Bounding pressure and temperature limits are listed for each of the piping material classes in the Piping Material Class Description document.

Information Assessed		Source Document	Assessment
Strength	Maximum flows and any unusual operating stresses are identified	Drawings and System Description listed above under References.	The expected flow paths for the LVP MTU subsystem equipment are identified on the P&ID drawings listed under References. Per the System Description document, the maximum air flow is that which maintains the required vacuum in the offgas header. This airflow is provided by the LVP exhausters, LVP-EXHR-00001A/B/C, which are automatically adjusted to maintain a constant vacuum depending upon the number of melters online and the number of melters being fed. The vacuum will be monitored at the offgas header where the LAW melter primary offgas lines and the vessel vent line join. There are no unusual operating stresses associated with the LVP MTU subsystem equipment.
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings and System Description listed above under References.	The LVP MTU subsystem equipment considered in this assessment is located in process rooms within the LAW facility. Secondary containment within these areas is provided by the facility and is outside the scope of this integrity assessment.

JAN 07 2005

AREVA

COGEMA-05-0006

Ms. D. J. Whiting
Bechtel National, Inc.
Waste Treatment Plant
2435 Stevens Center Place
Richland, Washington 99352

January 7, 2005

Dear Ms. Whiting:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00138 - STRUCTURAL INTEGRITY ASSESSMENT LOW ACTIVITY WASTE FACILITY (LAW) SECONDARY OFFGAS/VESSEL VENT PROCESS SYSTEM (LVP) MISCELLANEOUS TREATMENT UNIT (MTU) SUBSYSTEMS ANCILLARY EQUIPMENT

The integrity assessment of the subject ancillary equipment has been completed per the contract requirements and is enclosed for your use. The assessment found the design intent is sufficient to ensure that the ancillary equipment will be adequately designed and will have sufficient structural strength, compatibility with the waste(s) to be processed/stored/treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact Tarlok Hundal at (509) 373-4438, or via facsimile at (509) 372-0504.

E. A. Nelson, Director
Engineering & Technology
COGEMA Engineering Corporation

kld

Attachment

cc: D. C. Pfluger MS4-E2 w/ attachment

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